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PATENT SPECIFICATION

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(54) A PROFILE FOR ASSEMBLY OF BEAMS OR CONSTRUCTION ELEMENTS

(71) We, EURAMAX ALUMINIUM S.A. of Boite Postale No. 25, Avenue Louis Antoine Beaumier, 42160 Andrezieux Boutheon, France, a French Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to means used for assembly of beams or other construction elements, which are designed to form a frame or any other kind of load-bearing framework.

It has already been proposed to replace the conventional welding of beams together by the provision of connecting brackets in which generally comprise plates mounted on the beams or construction elements and joined together by means of bolts or rivets. Even if such means are simple and easy to put into operation they do not give entire satisfaction, because the plates contribute only very little to the overall mechanical strength of all the assemblies obtained, which, most frequently, form joints having poor or uncertain mechanical properties, in any type or framework.

In order to mitigate this disadvantage, it has also been proposed to assemble beams or other construction elements by means of cast members having a shape related to the beams or construction elements. These cast members are generally constituted in the form of angle members the perpendicular arms of which are interconnected by common parallel bends which help to confer on the members a particularly high mechanical strength.

Even if these components make it possible to respond to the above problem favourably, it is time to remark that they have a certain number of disadvantages which cannot be overlooked.

In the first place, it is necessary to manu-

facture the components in a large number of different sizes and shapes capable of responding, in each case, to the characteristics of dimension and shape of the beams or other construction elements which are capable of being assembled. Therefore, this increases the number of moulds which are necessary and, as a result, significantly increases the cost price of each part manufactured. In the second place, manufacturing parts by casting does not make it possible to guarantee constant consistency of the different parts made and this could produce different characteristics of mechanical strength from one part to the next. This disadvantage is obviously of major importance when it is necessary to manufacture frames or frameworks, the different assembly joints of which must have constant and well-determined characteristics of mechanical strength. In the third place, the large number of models of the cast members possible greatly complicates keeping of stock, as much in terms of units of manufacture and production as in terms of distribution and/or application.

The present invention seeks to solve or reduce the above-mentioned problem by creating a new tubular profile, extruded for seamless assembly of beams or other construction elements, this profile being particularly envisaged for remedying the disadvantages above mentioned and for providing a very high degree of versatility in its application and implementation while having its own particularly precise and constant properties of mechanical strength.

According to the invention, there is provided a profile element for the assembly of beams or construction elements comprising an extrusion having in cross section two arms joined together at one end to form an angle with a flattened apex and interconnected between their ends by a cross web to provide a generally triangular hollow

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section, this hollow section being divided by a web extending from the flattened apex to the mid point of the cross web.

5 The invention also concerns assemblies obtained by applying the extruded tubular profile defined above.

The invention will now be described in greater detail, by way of example, with reference to the drawings, in which:—

10 Fig. 1 is a perspective view showing an extruded tubular profile in accordance with the invention;

Fig. 2 shows an elevation illustrating an example of assembly of two profiles having a U-shaped section in an orthogonal direction by means of a short length of the profile in accordance with the invention, and

15 Fig. 3 is a section taken along the line III-III of Fig. 2.

20 Fig. 1 shows a profile of the invention which has been obtained by extrusion and is either made of metal or of a plastics material which may or may not be reinforced. The profile may be manufactured continuously and may be cut into pieces of any desired length subsequently in a manner similar to profiles or rods obtained according to similar processes.

25 The extruded profile contains two arms 1 and 2 which are flat and arranged, in the example shown, along two orthogonal planes in the same manner as those of a classic angled profile. The arms 1 and 2 do not meet directly at a sharp angle but, on the contrary, are interconnected by a web 3, which may be flat, for example. The arms 1 and 2 are also interconnected by a web or a triangulation wall 4 which is itself connected by its median part to the web 3 by a perpendicular web 5. The web 4 and the web 5 preferably comprise flat rectilinear walls interconnected and connected to the arms 1 and 2 by rounded portions 6 intended to combat the risk of the beginnings of local ruptures. The web 4 gives the profile a tubular shape together with the parts of the arms 1 and 2 which it subtends, said tubular shape being divided longitudinally by the web 5 and assuming a truncated triangular shape in transverse cross-section at the apex defined by the arms 1 and 2. In the above embodiment, the web 5 represents the bisecting line of the angle at the truncated apex and at the same time the median dropped from the same angle. In the embodiment where the apex angle defined by the arms 1 and 2 is different from a right-angle the web 5 preferably extends along the plane of the median of the said angle.

30 In accordance with another feature, the web or the triangulation wall 4 is connected to the arms 1 and 2 by webs 4a and 4b which each have a direction which is normal to the plane of the corresponding arm 1 or 2. This arrangement which is associated with

the web 3 and the rounded portions 6 has the advantage of making it easier to use an extrusion die and the advantage of suppressing excess material, which would result from acute joining angles, and particularly the advantage of regularly distributing the lines of isoconstraint parallel to the tubular profile which has been divided up into two box sections. Moreover, the linking up area or point P between the wall 4 and each of the arms 1 and 2 is situated at a distance d , starting from the free longitudinal edge of each of the arms, which distance is substantially equal to a third of the length L of the said arms. This arrangement makes it possible to support the arms 1 and 2 over the greater part of their width and to allow a rim or small flat wing 1a and 2a, projecting in relation to the general section of the profile to remain for each of these arms; the particular function of the profile appears hereafter.

As mentioned above, the profile of the invention is produced by extrusion such that, when it is a question of joining or assembling two beams or construction elements, which have to be maintained at right angles in the same general plane, a short length, hereafter termed a segment, of the profile is cut off in a direction, which is transverse to the longitudinal axis of the said profile, and over a width, which is substantially equal to that of the said elements or to the smallest of them. In the example shown in Figs. 2 and 3, the elements to be joined together comprise profiles 7 and 8 having a U-shaped section and having the same dimensional characteristics. In this case a segment S of the assembly profile is cut off, this having a length which is equal to the width of the flat internal part of the web of the profiles 7 and 8 in such a manner as to permit an introduction between the arms 7a-7b and 8a-8b and to obtain a regular and constant support bearing surface between the internal faces of the webs 7c and 8c and the external surfaces of the arms 1 and 2 of the segment S. Connection between the segment S and the profiles 7 and 8 is then established by means of securing elements, preferably rivets 9 passing through orifices made for this purpose in the webs 7c and 8c and in the small wings or rims 1a and 2a, the width of which is just sufficient to permit suitable application and distributed support of the riveting set or of the counter member of a riveting machine. Each rim 1a or 2a supports at least one rivet and preferably two, these being arranged, as illustrated in Fig. 3, at an equal distance on both sides of the axis common to two rivets 10 and ensuring connection between the arm 1 or 2 and the corresponding construction element. Rivets 10 are preferably of the blind type given that they penetrate into one or other of the two box sections of the

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profile for assembly. Nevertheless in some cases apertures may be formed in the wall 4 and in the web 5 in order to permit mounting of the simple or compound rivets on the one hand and the passage of a riveting tool on the other hand.

In the example shown in Figs. 1 and 2 it is confirmed that the segment S of the profile in accordance with the invention ensures intimate connection between the elements 7 and 8, with which it makes an assembly joint which is particularly resistant to flexural pull in the plane of the elements or of torsion with the presence of the wall 4 and the web 5.

In this example, it is noted that the maximum simple constraints capable of being exercised are applied by bending the rims 1a and 2a and by compression or traction at the wall 4 and the web 5, while the parts of the arms 1 and 2 contained between the points P and the web 3 are under a lesser pull, in contrast, owing to the fact of their position close to the centre of the junction of elements 7 and 8. For this reason, another feature which has been made possible by the transverse cross-sectional shape of the profile for assembly, consists in assigning to the parts of the arms 1 and 2 of the said profile which are contained between the web 3 and the points P, a thickness, which is less by about a third than that of the rims 1a and 2a, to the thickness of the rims 1a and 2a preferably being equal to that of the wall 4 and the web 5. This makes it possible to have at one's disposal a profile or segment of a lighter profile, which, with the same resistance, is more economical given the resultant gain in material.

The above described embodiments have therefore made it possible to carry out a particularly strong and fracture resistant assembly of two construction elements, while using only a single type of profile which may be easily cut up to a useful length even in situ. This provides great flexibility of implementation as well as simple and reduced administration of stock. Another advantage is that use of a single type of profile makes it possible to provide only a simple range of manufacture by continuous extrusion and consequently to considerably reduce the cost price per unit length. Moreover, in comparison to connecting brackets made of cast or moulded material, it becomes possible to arrange connecting elements of the same nature as the elements to be assembled and having known constant and identical mechanical properties from one segment S to another.

These various advantages make the profile particularly suited to the manufacture of frameworks or frames from construction elements, beams or profiles made of light

alloy. A specific application of the profile lies in the manufacture of a chassis for a towed vehicle, particularly for towing by cars, in particular for caravans.

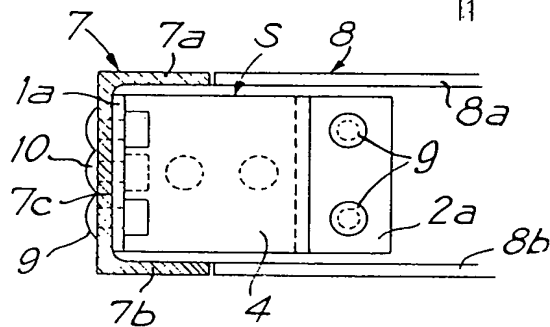
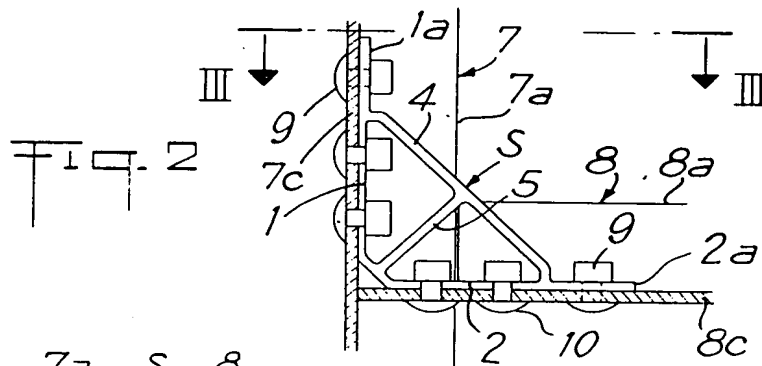
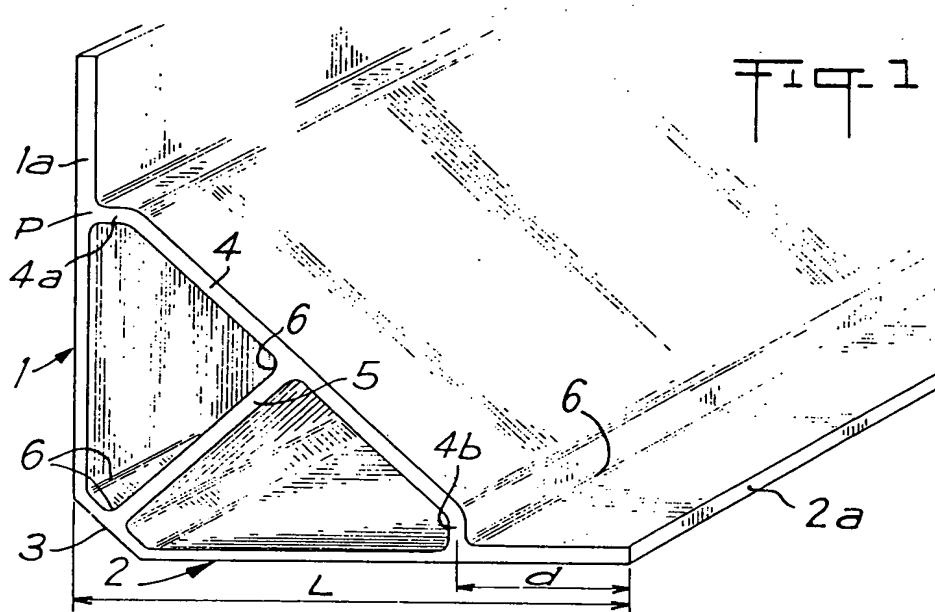
The invention is not limited to the embodiment shown and described in detail because various modifications may be supplied without going beyond the framework of the invention. In particular, cutting the segment S into pieces along one or two oblique sections in relation to the longitudinal axis of the profile may be envisaged so as to permit linking up either of beams of different width or of beams whose common plane forms an angle with the longitudinal axis of the profile which is different from a right-angle.

WHAT WE CLAIM IS:—

1. A profile element for the assembly of beams or construction elements comprising an extrusion having in cross section two arms joined together at one end to form an angle with a flattened apex and interconnected between their ends by a cross web to provide a generally triangular hollow section, this hollow section being divided by a web extending from the flattened apex to the mid point of the cross web.
2. An element according to claim 1, wherein the cross web is connected to the arms by two web portions each extending in a direction which is normal to the arms.
3. An element according to claim 2 wherein the web portions are connected to the two arms at a distance from the free longitudinal ends of these arms substantially equal to a third of their length.
4. An element according to any one of claims 2 or 3, wherein the parts of the arms contained between the flattened apex and the web portions of the cross web have a thickness which is less than that of the parts of the arms contained between the said web portions and their free longitudinal edges.
5. An element according to any one of claims 1 to 5, characterised in that the various arms, web portions and the webs have rounded portions between them.
6. An assembly comprising a plurality of beams or other construction elements and at least one profile element in accordance with any one of claims 1 to 5 connected up to the beams or construction elements by connectors passing through the arms and the webs.
7. An assembly in accordance with claim 6, wherein the connectors comprise blind rivets where these connectors extend into one or other of the parts of the divided hollow section of the profile element.
8. A profile element for the assembly of beams or construction elements substantially as described herein with reference to the drawings.

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